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Treatment Manual

Chemical Treatments

Fumigants • Methyl Bromide • Chamber Fumigation

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Methods and Procedures

Materials Needed

The procedures covered in this section provide commercial fumigators with the methods, responsibilities, and precautions for chamber fumigation.

- ◆ Colorimetric tubes (Draeger, Kitagawa, or equivalent)¹
- ◆ APHIS-approved leak detection device¹
- ◆ Methyl bromide
- ◆ Scale or graduated cylinder for volume (liquid measurements)
- ◆ SCBA or supplied air respirator¹
- ◆ APHIS-approved gas detection device
- ◆ Thermometer¹
- ◆ Volatilizer
- ◆ Warning signs

The chamber operator is responsible for supplying the above materials as well as ensuring that the chamber is certified for conducting PPQ quarantine treatments.

¹ You will need to bring these items unless the chamber is operated by PPQ, in which case all materials are provided by PPQ.

Conducting the Fumigation

Step 1—Selecting a Treatment Schedule

Select an appropriate treatment schedule to effectively eliminate the plant pest without damaging the commodity to be fumigated.

Turn to the treatment schedule Index and look up by commodity or by pest the treatment schedule(s) available. Treatment schedules which are approved for chambers will be listed as either “NAP” (normal atmospheric pressure) or as “vacuum.”

Step 2—Determining Section 18 Exemptions and Sampling Requirements

After selecting the treatment schedule, determine which treatment schedules are FIFRA Section 18 Exemptions. The schedule will be followed by an "IMPORTANT" note to help you determine the current exemption status. Some treatment schedules are only FIFRA Section 18 Exemptions at specific temperature ranges. Check the treatment schedule and temperature to determine if the fumigation will be a FIFRA Section 18 Exemption.

Residue monitoring by taking samples of the commodity prior to the start of the fumigation and after aeration is no longer required.

Step 3—Measuring the Temperature

Determine the temperature to use in selecting the proper dosage rate:

- ◆ For fruits, pulpy vegetables, or logs use only the commodity temperature.
- ◆ For all other commodities use both the commodity and air temperature.

To take the temperature readings, use a bimetallic, mercury, or digital long-stem thermometer that has been calibrated. Use [Table 2-5-1](#) on [page 2-5-3](#) to determine which temperature to use when selecting the proper dosage rate for commodities other than fresh fruits, vegetables, or logs. Record the temperatures in Block 22 of the PPQ Form 429.

If using the electronic 429 database, record the temperatures in the space and commodity fields in the Treatment form.



Commodity and space temperatures must be 40°F or above.

TABLE 2-5-1: Determine Whether to Use Commodity or Air Temperature for Determining Dosage Rate

If the air temperature is:	And:	Then, for commodities other than fresh fruits or vegetables or logs and lumber ¹ :
Higher than the commodity temperature	→	Use the single lowest commodity temperature for determining the dosage rate (Do Not use the average commodity temperature).
Lower than the commodity temperature	By 9 degrees or less	
	By 10 degrees or more	Use the average of the air and commodity temperature for determining the dosage rate

1 Use commodity temperature for fresh fruits or vegetables or logs and lumber.

Step 4—Calculating the Dosage

In order to calculate dosage, you must have the following information:

- ◆ Treatment schedule
- ◆ Volume of the fumigation chamber (ft³)
- ◆ Temperatures of commodity and air (°F)

Refer to the specific treatment schedule to determine the dosage rate (pounds/ft³).

The formula for calculating dosage is:

$$\begin{aligned} \text{dosage(lbs.)} &= \text{volume(ft}^3\text{)} \times \text{dosage rate(lbs./1,000 ft}^3\text{)} \\ &= \frac{\text{volume(ft}^3\text{)} \times \text{dosage rate(lbs.)}}{1,000 \text{ ft}^3} \end{aligned}$$

EXAMPLE: Using a fumigation chamber which has a volume of 500 ft³, you determine the temperature of the commodity and space is 72°F. The treatment schedule requires 2 lbs. MB/1,000 ft³ at 70°F or above. To calculate dosage multiply the volume (500 ft³) by the dosage rate (2 lbs. MB/1,000 ft³). This equals 1.0 lbs. of MB needed for the dosage.

Step 5—Conducting the Fumigation

Since fumigation chambers vary by manufacturer and model, refer to the manufacturer's operating manual to determine how to use the chamber. However, in any case, circulation fans in a chamber should be kept running for 15 minutes following introduction of the gas.

Aerating the Chamber

Responsibility for aerating the chamber and releasing the commodity depends on whether the treatment schedule used was a labeled use or FIFRA Section 18 Exemption. Use the following table to determine responsibility for monitoring the aeration of the fumigation.

TABLE 2-5-2: Determine the Responsibility for Monitoring the Aeration

If the fumigation chamber is:	And the treatment schedule is:	Then:
Privately or State owned	A labeled treatment	RELEASE the fumigation to the fumigator to aerate and release the commodity
	A FIFRA Section 18 Exemption (noted in the treatment schedules)	1. PPQ must MONITOR the aeration, and 2. USE the following table to determine which aeration procedures to follow
PPQ owned	—————▶	

Use the following table to determine which procedures to follow for aerating normal atmospheric pressure (NAP) and vacuum chambers.

TABLE 2-5-3: Determine the Aeration Procedure

If the chamber is:	And the cargo is:	Then:
NAP	Noncontainerized	Use the procedures on page 2-5-4
	Containerized	Use the procedures on page 2-5-5
Vacuum	—————▶	Use the procedures on page 2-5-5

Each chamber must be equipped with at least one permanent, metal gas sampling tube to allow you to take colorimetric tube readings during the aeration. Any extensions of the gas sampling tube or flexible connectors must be made of Teflon™ tubing or metal. The gas sampling tube must extend outside the chamber to allow for colorimetric tube readings.

Normal Atmospheric Pressure Chamber—Aerating Noncontainerized Cargo

Step 1—Securing the Area

Assuming that you’ve already secured the fumigation area, allow only the chamber operator and the PPQ officer monitoring the fumigation into the secure area.



Do **not** allow motorized vehicles to operate within the secure area.

Step 2—Aerating the Chamber

Run the exhaust long enough to obtain at least four complete changes of air (about 4 to 15 minutes per change of air or 1 hour).

Step 3—Taking Concentration Readings

Use a colorimetric tube to take a concentration reading **within the carton or box**. Exceptions may include compressed cotton and other very difficult to probe commodities. Obtain prior approval from CHPST for exceptions to this rule.

For FIFRA Section 18 exemptions, record the concentration reading (in ppm), date, and time in Block 39 of PPQ Form 429. If using the electronic 429 database, record the date, time and detector reading (in ppm) in the "Detector Readings" form.

Use [Table 2-5-4](#) on [page 2-5-5](#) to determine when to release the commodity

TABLE 2-5-4: Determine When to Release the Commodity

If the gas concentration is:	Then:
5 ppm or less	RELEASE commodity
6 ppm or above	1. TAKE concentration readings, and 2. RELEASE commodity when the concentration level is 5 ppm or less

Normal Atmospheric Pressure Chamber—Aerating Containerized and Noncontainerized Cargo

Step 1—Securing the Area

Assuming that you've already secured the fumigation area, allow only the chamber operator and the PPQ officer monitoring the fumigation into the secure area.



Do **not** allow motorized vehicles to operate within the secure area.

Step 2—Aerating the Chamber

Run the exhaust long enough to obtain at least four complete changes of air (about 4 to 15 minutes per change of air or 1 hour). If the containers have internal fans, run them unless they are operated by internal combustion engines. Remove container from the chamber at the conclusion of four complete changes of air to a secure outdoor area for passive aeration. Wear the SCBA while the container is being moved outdoors.

Step 3—Taking Concentration Readings

Use a colorimetric tube to take a concentration reading **within the carton or box**. Exceptions may include compressed cotton and other very difficult to probe commodities. Obtain prior approval from CHPST for exceptions to this rule.

For FIFRA Section 18 exemptions, record the concentration reading (in ppm), date, and time in Block 39 of PPQ Form 429. If using the electronic 429 database, record the date, time and detector reading (in ppm) in the "Detector Readings" form.

Use the following table to determine when to release the commodity.

TABLE 2-5-5: Determine When to Release the Commodity

If the gas concentration is:	Then:
5 ppm or less	RELEASE commodity
6 ppm or above	1. CONTINUE passive aeration 2. TAKE concentration readings, and 3. RELEASE commodity when the concentration level is 5 ppm or less

Vacuum Fumigation Chambers—Aerating Containerized and Noncontainerized Cargo

Step 1—Securing the Area

Assuming that you've already secured the fumigation area, allow only the chamber operator and the PPQ officer monitoring the fumigation into the secure area.



Do **not** allow motorized vehicles to operate within the secure area.

Step 2—Aerating the Chamber

Adjust any vacuum remaining at the end of the fumigation to zero by temporarily opening the air intake valve, then closing it. Draw a 15 inch vacuum and adjust it to zero. Repeat this process of drawing a 15 inch vacuum and releasing it four times or as many times as experience indicates is necessary.

Step 3—Taking Concentration Readings

Use a colorimetric tube to take a concentration reading **within the carton or box**. Exceptions may include compressed cotton and other very difficult to probe commodities. Obtain prior approval from CHPST for exceptions to this rule.

For FIFRA Section 18 exemptions, record the concentration reading (in ppm), date, and time in Block 39 of PPQ Form 429. If using the electronic 429 database, record the date, time and detector reading (in ppm) in the "Detector Readings" form.

Use [Table 2-5-6](#) on [page 2-5-7](#) to determine when to release the commodity.

TABLE 2-5-6: Determine When to Release the Commodity

If the gas concentration is:	Then:
5 ppm or less	RELEASE commodity
6 ppm or above	<ol style="list-style-type: none">1. Do two more vacuum washes2. TAKE concentration readings, and3. RELEASE commodity when the concentration level is 5 ppm or less



Important

Some vacuum chambers do not have sampling tubes. After four air washes, while wearing the SCBA, open chamber door and take colorimetric reading within the carton or box.

